

COMET 1902 c (GRIGG).—A communication from Mr. P. Baracchi, director of the Melbourne Observatory, to No. 3828 of the *Astronomische Nachrichten* states that a search was made for this comet on the first available evening after Mr. Grigg's announcement of its discovery, but without success; nor has the comet been found by any of the Australian observatories. This may be accounted for by the prevalence of bright moonlight on the available nights and by the statement of Mr. Grigg that the object was an extremely faint one.

Enclosed with this communication is a list of the observations made by the discoverer. These observations state that the comet, when first seen, appeared as a faint nebula and was about twice the diameter of Jupiter, the atmosphere never being quite clear. Fourteen observations were made between July 23, when the comet was first seen, and August 3, but after the latter date, bad weather and bright moonlight prevented any further observations.

The instrument used was a 3½-inch refractor, and the N.A. clock stars  $\beta$ ,  $\gamma$  and  $\delta$  Virginis, and  $\nu$  Virginis, were observed as "near" stars, the apparent position of the last named being taken as 11h. 40m. 52s. + 7° 4' 5".

From the observations made on July 24, 27 and 30, Mr. Grigg has computed the following corrected elements:—

T = 1902 June 20<sup>h</sup> 33 G.M.T.

$\omega = 301\ 46\cdot1$

$\Omega = 217\ 31\cdot4$

$i = 16\ 42\cdot9$

$\log q = 9\cdot76618$ .

The position for August 3 as computed from these elements differs by + 1m. 36s. and + 4' from the observed position on that date.

The computed position at perihelion was  $\alpha = 113^\circ\ 34'$ ,  $\delta = + 15^\circ\ 23'$ , about  $10^\circ$  north of Procyon, the apparent distance from the sun being  $25^\circ$  E.,  $6^\circ$  S. The longitude of the comet from the sun would then increase, and the comet would pass through Cancer towards Regulus until it reached Virgo at the time of its discovery by Mr. Grigg.

APPARENT DEVIATIONS FROM NEWTON'S LAW OF GRAVITATION.—In a paper read at the Göttingen meeting of the *Astronomische Gesellschaft* on August 4, Herr Peter Lebedew reviewed the various theories which have ever been proposed to account for the apparent contradiction to the law of gravitation as observed in the repulsion of comets' tails from the sun, and he finally accepts the theory of Kepler, which attributes the repulsive force to solar radiation.

The author stated that he had recently confirmed the quantitative relation expressed in the formula for this repulsion, due to Maxwell and Bartoli.

For a spherical body, the diameter of which is great as compared with the wave-lengths of the solar radiation, the resulting action (F) is expressed, in gravitational units, by the formula

$$F = 1 - \frac{1}{10,000} \cdot \frac{1}{r\delta}$$

where  $r$  is the radius in centimetres and  $\delta$  is the density of the body as compared with that of water. For dust particles, the diameters of which are comparable with the wave-lengths of the solar radiation, the above relation does not hold good.

This relation explains the varying behaviour of different parts of a comet, for it is obvious that, in a cometary nucleus made up of meteorites of various dimensions and densities, we should expect varying values of F.

TOTAL LIGHT OF ALL THE STARS.—Mr. Gavin J. Burns contributes to No. 3, vol. xvi. of the *Astrophysical Journal* an interesting account of some results he has obtained whilst attempting to estimate the total light of all the stars.

In the first place, he determined the relative brightness of different parts of the sky by observing these different parts through varying thicknesses of ordinary clear glass, and then determining what proportion of the total incident light was transmitted by a unit thickness of glass. He found that the luminosity of the Milky Way varies from two to three times the luminosity of the rest of the sky.

Secondly, he compared the luminosity of the stars with that of the normal sky by the method of putting the star image out of focus until its apparent brightness was equal to that of the sur-

rounding sky; by this process he deduced, from the mean of several independent observations of various stars, that half a square degree of non-Galactic sky gives as much light as a fifth-magnitude star. From further observations, Mr. Burns found that, given a perfectly black background, stars as faint as the eighth magnitude would be readily visible.

### WEST INDIAN VOLCANIC ERUPTIONS.

AS a panacea for much ignorance, the subtle fluid of Franklin stands next to superstition. If you cannot explain the angry workings of a volcano by a Pluto, a Vulcan or the straggles of the damned, tell the man in the street that it is due to electricity and he is happy. At the present moment, in seventeen columns of the *Revue Scientifique* of September 6, M. Arthur Tarquin offers to the world an electrical theory of volcanic action which, to a great extent, is novel. At the outset we are told that the earth is entirely governed by the sun, and as its energy varies so will various activities on the earth vary. In establishing such a connection for volcanic activity, M. Tarquin, however, poses as a special pleader. In Tokio, for example, he says that earthquakes (*sic*) are most numerous about the times when sun-spots are at a maximum and *at a minimum*. Dr. E. Naumann, who examined the earthquake registers of Japan, however, failed to find such a connection, and others who have worked with materials relating to other countries have arrived at similar conclusions. As another example of incompleteness in statement, we are told that at the "*moment précis*" of the eruption in Martinique, with a mathematical exactitude magnetic needles at observatories throughout the world were violently disturbed. Even if we admit this to have been the case, we fail to see why similar phenomena were not observed with the more violent eruption which took place the day previously in St. Vincent.

As solar energy penetrates denser and denser layers of the earth's atmosphere, the same becomes warmer and warmer; why, therefore, asks M. Tarquin, should not the internal heat of the earth be explained by similar reasoning? This heating he apparently regards as the result of an increasing resistance to the passage of electricity. The oceans are regarded as vast accumulators. Electric potential is greater where ocean currents meet with obstacles, as, for example, where the Gulf stream passes the Antilles, and it is, therefore, in such places where volcanic activity is pronounced.

So convinced was M. Tarquin of the truth of his theory that he brought the same to the notice of M. le Ministre des Colonies, but it apparently received but small consideration. An official commission was sent to Martinique, but it neither foretold the eruption of July 9 nor that of August 27. On the contrary, it concurred in the return of the inhabitants to their deserted homes and the establishment of brigades of soldiers at Morne Rouge and other places, whilst the chief of the scientific mission issued in the official journal a letter assuring the inhabitants of safety.

This advice M. Tarquin holds to have been based on classical but false hypotheses respecting the cause of volcanic activity, and the exposition of these views lulled many into a feeling of security which they paid for with their lives. The theory of the "pyrophiles" is dangerous to humanity.

The *Revue Scientifique* of September 13 contains a report by the delegates of the Paris Académie des Sciences on the eruption in Martinique of May 8.

This first refers to a chronological account of the eruptions and various volcanic manifestations before the destruction of St. Pierre, and gives a description of the crater of Mont Pelée. By the eruption many fissures were formed, the existence of which is recognised by lines of steam vents. These continued beneath the sea, and accounted, no doubt, for the interruption of the cables and the numbers of dead fish observed on May 5. From these fumaroles steam and sulphuretted hydrogen escape, and round their orifices crystals of sulphur and sal-ammoniac are found. Their temperature at a depth of 0·10m. is about 400° C. Along the beds of the rivers Blanche and Sèche, and particularly near their mouths, these vents are very vigorous, but they vary in their activity and give rise to variations in the temperature of the water in the rivers.

The cinders which fell at Prêcheur formed a layer about 25 centimetres in thickness. At Carbet lapilli one centimetre in diameter were common. Some fragments were larger, and were

similar to those which fell at Fort de France and François on May 8 and 20. On July 9 the character of the ejectamenta became more pumiceous. Bombs 1·3m. in diameter were projected 800 metres. There does not appear to have been any change in the depth of the ocean near to St. Pierre.

On May 8 at the time of the eruption the sea at Fort de France receded 1m., and there were five or six undulations at intervals of about five minutes. Similar movements were also observed on May 20 and 26, June 6 and July 9. From May 7 to May 10 an unusually strong current was observed on the west coast. Each eruption was accompanied by a barometric oscillation from 1 to 3mm. in amount.

In *McClure's Magazine* for August, and in the *Fortnightly Review* for September, Prof. Angelo Heilprin contributes an article on "Mont Pelée in its Might."

For the first time we are told that for three months before the fatal explosion of May 8 Pelée had been rumbling, and that there had been occasional emissions of steam. The hour at which this explosion took place is fixed by the s.s. *Pouyer Quartier* and by the cable office at Fort de France at 8h. 2m. a.m., but according to the dial of the Hôpital Militaire of St. Pierre the time was 7h. 52m. a.m.

The first explosion would therefore appear to have resulted in ruin the distribution of which was quaquaversal. It might, for instance, have been produced by the explosion of a gas cloud. The latter, which left ruins with a definite orientation, may have had the character of a blast propagated in one direction.

No doubt, Prof. Heilprin concludes, there were numerous electric explosions, unmistakable evidence of which is found in perforated pottery and metal wares.

In the *Popular Science Monthly* for August, Dr. Thomas A. Jaggar gives an account of his visit to Martinique and St. Vincent. His first landing at St. Pierre was on May 21, the day after the second great eruption of Mont Pelée. Masonry had been completely destroyed, there was an absence of large volcanic fragments, and "everything was coated with a green-grey powder or sand." No sign of molten rock was found either here or in St. Vincent. At the latter island La Soufrière was ascended twice, after which Dr. Jaggar proceeded to Barbados to learn something of the dust showers which had covered that island.

At Walliabout and Richmond the same fiery blast swept down from La Soufrière as that which swept down on St. Pierre, and just as St. Pierre is buried so is Richmond buried, the ashes at the northern end of the town being 45 feet in thickness and three feet at the southern end. The masonry in the village was swept over, and 5-foot blocks of the same were blown to distances of 40 feet. On the west sea front of the Soufrière there are now vertical walls of earth in certain places 50 feet in height where before there was a village.

M. M. Ballou, in his "Equatorial Africa," writing in 1892, says that "it is confidently predicted (that Mont Pelée) will one day deluge St. Pierre with ashes and lava, repeating the story of Pompeii," a prediction, Dr. Jaggar remarks, based on "well-authenticated data."

Before this last eruption, so far back as January, the lake in the crater at Pelée was warm and the odour of sulphuretted hydrogen was perceived. In April, steam was emitted and rumblings were heard. From April 24 there were actual eruptions.

In St. Vincent, local earthquakes had been on the increase for a year, and so far back as May, 1901, people were frightened away from the north-west slope of the Soufrière by rumblings and quakings. The lake bubbled and sulphurous coatings were found on the rocks. In short, the signals were so pronounced that the leeward slopes of the Soufrière were abandoned, and hence the small loss of life. Had the Governments of both islands maintained vulcanological stations, the records of "tremors, sounds, sights, smells and temperatures" would no doubt have formed an increasing series of warnings.

In the Blue-book (Cd. 1201) we find 144 official communications relating to the volcanic eruptions in St. Vincent and Martinique in May, 1902. These, as may be expected, are varied in their character. Some refer to earthquakes, others to eruptions. Many are requests for assistance, whilst others are expressions of sympathy. In communication No. 129, Mr. Secretary Chamberlain calls the attention of the Board of Trade to the bravery of Captain Freeman and suggests that it should not be allowed to pass without recognition. The reply

to this states that the Board has decided to award Captain Freeman a piece of plate in recognition of his gallantry. Other communications deal with the mineralogical character of the ejectamenta, personal experiences within the devastated zone, pecuniary losses and other matters. Although many of the notes in this volume have but a small scientific value, there yet remains much not to be overlooked by those who compile the history of these terrible disasters.

Dates of Volcanic Eruptions in Central America and the West Indies (Rockstroh-Fuchs).

1552	...	1699	...	1785—	...	1852—
1526—	...	1705—	...	1797×—	...	1853—
1541	...	1706	...	1798—	...	1854—
1565—	...	1707	...	1799—	...	1855—
1581	...	1709—	...	1802×—	...	1855—
1582—	...	1710	...	1803—	...	1856—
1585-6—	...	1717—	...	1809—	...	1857—
1614	...	1718×—	...	1812×—	...	1858—
1623	...	1723	...	1821—	...	1860
1643	...	1726	...	1828	...	1865
1651—	...	1732—	...	1829—	...	1867—
1664	...	1737—	...	1833	...	1868
1668—	...	1764	...	1835—	...	1869—
1670	...	1766×—	...	1836×—	...	1870
1671	...	1770	...	1844—	...	1873
1677—	...	1772	...	1847—	...	1880—
1686	...	1775	...	1850	...	1883
1692×—	...	1775	...	1851×—	...	1902×—

West Indian eruptions are marked ×.

Unusual seismic disturbances are marked —.

From the above, which is chiefly compiled from the writings of Rockstroh and Fuchs, it will be noticed that *all* the West Indian eruptions have been accompanied by unusual seismic disturbances either in the West Indies themselves or in neighbouring rock folds.

J. MILNE.

### UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

CAMBRIDGE.—In consequence of the large number of students in the department of anatomy, it is proposed to appoint two additional demonstrators, to be paid from the fees received for instruction.

The State Medicine Syndicate report that ninety candidates have been examined by them in the present year; of these, fifty-two were successful in obtaining the University diploma in public health. The Syndicate propose that a second grant of 1000*l.* be made from the funds in their hands toward the new Medical School buildings, in which provision will be made for teaching and examinations in sanitary science.

The Sedgwick Memorial Museum of Geology is nearly ready for occupation; the building syndicate estimate the cost for structure and fittings at more than 45,000*l.* Of this, some 27,000*l.* comes from the accumulated subscriptions to the memorial fund, 3000*l.* will be obtained from the University Press profits, and the balance probably from the benefaction fund.

THE Right Hon. Sir William Hart Dyke, Bart., M.P., will distribute the prizes at the Merchant Venturers' Technical College, Bristol, on Friday, December 12.

THE *Athenaeum* announces that Sir William Muir has resigned the post of principal of the University of Edinburgh, which he has held since 1885.

In his inaugural address at the opening of the session of the Royal College of Science, Prof. Perry expressed his anxiety for the creation of a fund to provide bursaries to assist the national scholars and other Government students. We are glad to hear that this fund has been started with a gift of 100*l.* from the Drapers' Company, to be divided equally among ten of the scholars. The Company do not pledge themselves to continue this help.

LOCAL museums and local natural history societies can be of much assistance to nature-study in schools by directing attention to observations of natural objects. We are, therefore, glad to see that there will be a conference on nature-study at the Stepney Borough Museum on December 3, at 5.30 p.m.,